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United States Patent [19]**Weigand et al.**[11] **Patent Number:** **5,784,368**[45] **Date of Patent:** **Jul. 21, 1998**[54] **METHOD AND APPARATUS FOR PROVIDING A SYNCHRONOUS COMMUNICATION ENVIRONMENT**[75] Inventors: **David L. Weigand**, Buffalo Grove;
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both of Ill.[73] Assignee: **Motorola, Inc.**, Schaumburg, Ill.[21] Appl. No.: **311,467**[22] Filed: **Sep. 23, 1994**[51] **Int. Cl.⁶** **H04J 3/06**[52] **U.S. Cl.** **370/310; 455/502**[58] **Field of Search** 370/18, 98, 29,
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350, 503, 507, 509, 510, 512; 375/356,
354; 455/51.1, 56.1, 71, 13.3, 51.2, 524,
502, 503[56] **References Cited****U.S. PATENT DOCUMENTS**

3,983,498 9/1976 Malek .
 4,626,914 12/1986 Breimer .
 4,696,052 9/1987 Breeden .
 4,887,266 12/1989 Neve et al. .
 4,901,368 2/1990 Arnold et al. 370/74
 5,117,441 5/1992 Weigand .
 5,124,698 6/1992 Mustomen .
 5,144,668 9/1992 Malek et al. .
 5,212,715 5/1993 Pickert et al. .
 5,257,404 10/1993 Goreham et al. 375/356
 5,260,944 11/1993 Tomabechi 370/95.1
 5,285,443 2/1994 Patsiokas et al. .

5,287,384 2/1994 Avery et al. .
 5,293,423 3/1994 Dahlin et al. .
 5,293,645 3/1994 Sood .
 5,327,581 7/1994 Goldberg 375/356
 5,388,102 2/1995 Griffith et al. .
 5,448,570 9/1995 Toda et al. 370/103

FOREIGN PATENT DOCUMENTS

578506A2 7/1993 European Pat. Off. .
 592209A1 10/1993 European Pat. Off. .
 626796A1 5/1994 European Pat. Off. .
 94/18764 9/1994 WIPO .
 94/22245 9/1994 WIPO .
 94/28643 12/1994 WIPO .

Primary Examiner—Douglas W. Olms*Assistant Examiner*—Ajit Patel*Attorney, Agent, or Firm*—John J. King[57] **ABSTRACT**

An apparatus and method provides synchronous communication in a communication environment (102) wherein multiple base stations are adapted to operate on the same frequencies. In particular, the base stations which operate within range of one another must be coordinated to minimize interference with other base stations which may otherwise operate independently. Each base station operating in a system will determine whether another base station operating on the same frequencies is within range (310). One of the base stations will assume a role as a master and the remaining base station will then synchronize to the master base station (312). The preferred methods for synchronizing the base stations includes signaling protocols (702, 902) and collision avoidance techniques for digital multiple access communication systems.

5 Claims, 10 Drawing Sheets